

Chapter 5 Review

Classifying Chemical Reactions

Multiple Choice

For each question below, select the best answer.

- What is the most likely product(s) of the synthesis reaction between a metal and a non-metal?
 - two ionic compounds
 - a binary ionic compound
 - a ternary ionic compound
 - an element and an ionic compound
 - a molecular compound
- Which of the following would help you to recognize an equation for a decomposition reaction?
 - The chemical equation has a single product.
 - The chemical equation has a single reactant.
 - The chemical equation has two compounds for reactants and two different compounds as products.
 - The chemical equation has an element and a compound for reactants and a different element and compound for products.
 - There is no characteristic that would distinguish this type of reaction.
- What are the most likely product(s) of the single displacement reaction between a metal and an ionic compound in aqueous solution?
 - two ionic compounds
 - a metal and a non-metal
 - a non-metal and an ionic compound
 - a metal and an ionic compound
 - a molecular compound
- Which statement best describes the reaction that is represented by the following general equation?
$$X + YZ \rightarrow XZ + Y$$
 - a double displacement of the metal Y by the non-metal X
 - a single displacement of the metal Y by the metal X
 - a single displacement of the non-metal Y by the metal X
 - a single displacement of the non-metal Y by the non-metal X
 - a double displacement of the non-metal Y by the non-metal X

5. What type of reaction is represented by the model shown below?



- single displacement involving a metal
 - decomposition
 - synthesis
 - single displacement involving a non-metal
 - double displacement
- What is the result of placing magnesium metal into a solution of zinc chloride?
 - Zinc metal forms as magnesium replaces it from the solution.
 - Chlorine gas forms as magnesium replaces it from the solution.
 - No reaction occurs because magnesium is higher than zinc in the activity series.
 - No reaction occurs because magnesium is lower than chlorine in the activity series.
 - No reaction occurs because magnesium is lower than zinc in the activity series.
 - Which of the following is *not* likely to increase as a result of removing catalytic converters from vehicles?
 - unburned fuel in the air
 - smog
 - carbon dioxide emissions
 - ground level ozone
 - nitrogen oxide in the air
 - Which chemical is used to preserve dried fruits but also causes an allergic response in some people?
 - nitrogen dioxide
 - sodium cyanide
 - carbon dioxide
 - sulfur dioxide
 - sodium hypochlorite

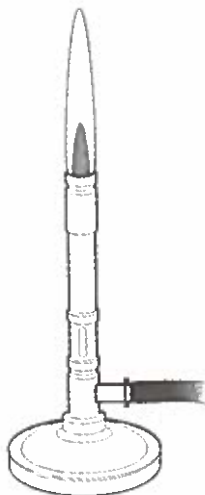
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Written Answer

Answer the following questions in your notebook.

9. What evidence of chemical change is a result of a change in the energy of the substances in the reaction?
10. Explain how synthesis and decomposition reactions are reverse processes of each other.
11. For each of the following reactants, identify the type of reaction. Assume a reaction does occur. Explain your answers.
 - a. $\text{Ni}_2\text{O}_3(\text{s}) \rightarrow$
 - b. $\text{Cl}_2(\text{g}) + \text{SrBr}_2(\text{aq}) \rightarrow$
 - c. $\text{Na}(\text{s}) + \text{N}_2(\text{g}) \rightarrow$
 - d. $\text{CaI}_2(\text{aq}) + \text{Na}_2\text{S}(\text{aq}) \rightarrow$
 - e. $\text{Mg}(\text{s}) + \text{ZnBr}_2(\text{aq}) \rightarrow$
12. For each reaction in question 11, predict the products and write a balanced chemical equation.
13. Describe the difference between complete combustion and incomplete combustion of gasoline.
14. When using a laboratory burner like the one shown below, a blue double cone indicates the proper mix of oxygen and fuel. A yellow flame indicates too little oxygen for the amount of gas present.



- a. What are the products of the complete combustion of the fuel?
 - b. Why might having a yellow flame cause a harmful situation?
15. What are the catalysts in a catalytic converter?
16. Why is the use of cyanide compounds in gold production strictly controlled?

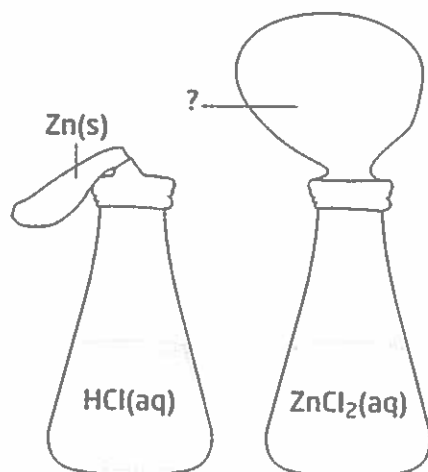
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Written Answer

Answer the following questions in your notebook.

17. Identify at least one common occurrence that demonstrates each of the following pieces of evidence of a chemical change. **T/I**
- production of light
 - change in odour
 - change in colour
18. Describe a situation in a sport that can be used to model a synthesis reaction. **A**
19. Explain why it is not necessary to know the charge of a multivalent metal when predicting the products formed during the decomposition of a binary ionic compound that contains the metal. **T/I**
20. A teacher performs a demonstration for a class in which a balloon is inflated through the reaction of zinc with hydrochloric acid, as shown below. **T/I**



- What type of reaction occurred?
 - What gas will the balloon contain? Explain your answer.
21. You see a movie in which the villain destroys a solid gold artifact by dropping it into hydrochloric acid, HCl(aq) , where it bubbles and vanishes. Is this a scientifically accurate portrayal? Explain your reasoning. **A**
22. Compare the solubility of a precipitate with the solubility of the second product in a double displacement reaction. **T/I**
23. How is a solid formed during a single displacement reaction different than a solid formed during a double displacement reaction? **T/I**
24. Both single and double displacement reactions result in removal of an ion from a solution. Which type of displacement reaction would you use if the ion were of a valuable element, such as gold? **A**

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Written Answer

Answer the following questions in your notebook.

25. The image on the right shows a common scene in a hockey game. Use this event to help describe a single displacement reaction. **C**
26. Write a set of instructions for determining the products of a double displacement reaction. **C**
27. Most metals are recovered from compounds that are part of ores that are mined. What type(s) of reactions would most likely be used in these recovery steps? Explain your reasoning. **A**
28. Create a pamphlet to inform people of the hazards and benefits associated with the use of chlorinating agents in treating swimming pools. **C**
29. Make a diagram that shows the changes that nitrogen gas and oxygen gas undergo as they travel from the atmosphere, into a car's engine, through a catalytic converter, and back into the atmosphere. On your diagram, show balanced chemical equations for the reactions that occur. **C**
30. While preparing to clean your kitchen, you notice that the product you will use has the HHPS symbol below. What precautions should you take before using this product in the kitchen? Explain your reasoning. **A**



31. Make a comparison table to list some of the positive and negative aspects of a hydrogen economy. **C**
32. Two people are working together to clean a house. The first person to work in the bathroom cleans and disinfects the sink and other hard surfaces. The second person to work in the bathroom cleans the mirror and window. A short time later, the second person complains of irritation in the nose and throat, but the first person feels fine. Provide a likely explanation for what happened and include the likely cleaning supplies that led to the condition. **A**